REMARKS

Claims 1, 4-7, and 10-16 are pending in this application. By this Amendment, claims 1 and 7 are amended, claims 2, 3, 8 and 9 are canceled without prejudice to or disclaimer of the subject matter contained therein, and claims 13-18 are added. No new matter is added.

In the Office Action, claims 1-12 are rejected under 35 U.S.C. §102(b) over Japanese Patent Publication No. 7-42607 to Shibata. Additionally, claims 1-12 are rejected under 35 U.S.C. §102(b) over Japanese Patent Publication No. 9-250,435 to Nakamura (which corresponds to U.S. Patent No. 5,778,857). These rejections are respectfully traversed.

Twelve total claims stand rejected, including four independent claims (claims 1, 4, 7 and 10). The Office Action summarily rejects all collectively by paraphrasing of Applicants' independent claim 1. It is thus submitted that a *prima facie* case of anticipation has not been met with respect to any of the specific additional features recited in the various dependent claims or independent claims 4 and 10, which are directed to correction of timing based on calculation of a heat generation rate.

In particular, with respect to independent apparatus claim 4 and similar independent method claim 10, the Patent Office has failed to make a *prima facie* showing that Shibata or Nakamura teach a control apparatus or method for a combustion engine that "calculates a heat generation rate at predetermined timing based upon the in-cylinder pressure…and an in-cylinder volume at timing of detecting the in-cylinder pressure" or corrects "timing of combustion starting in the cylinder based upon the heat generation rate calculated" as recited in independent claims 4 and 10 and claims dependent therefrom. Therefore, these claims are not anticipated by either Shibata or Nakamura.

Independent claims 1 and 7 are amended to incorporate the features of canceled claims 2-3 and 8-9, respectively. These claims now recite that the calculation of combustion rate is achieved based on a control parameter "including a product of the in-cylinder

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pressure...and a value obtained by <u>exponentiating the in-cylinder volume...with a predetermined index.</u>" Support for this feature can be found, for example, in Applicants' specification at page 21, lines 5-26. These claims further recite a specific predetermined timing and a calculation of combustion rate associated with opening timings of the intake and exhaust valves.

Neither Shibata nor Nakamura teach or suggest such features. Shibata discloses calculating combustion rate from in-cylinder pressure P and a value obtained by exponentiating in-cylinder volume V with an index n to control ignition timing so that the combustion rate is equal to the target combustion rate. Shibata also discloses that the in-cylinder pressure is detected at four timings, such as 30 degree BTDC, 0 degree BTDC, 30 degree ATDC and 60 degree ATDC. The four timings include two timings, one of which comes before the combustion starting, and another of which comes after the combustion, since the combustion rate at the first timing is assumed as 0% and the combustion rate at the fourth timing is assumed as 100%. Shibata, however, fails to define the detection timing of the in-cylinder pressure associated with the opening timings of the intake and exhaust valves. This feature may improve the accuracy of the combustion starting timing control, specifically in an engine in which the opening and closing timings of the intake and/or exhaust valves are variable, since it is not required to obtain an amount of intake air in the combustion chamber. Accordingly, independent claims 1 and 7 and claims dependent therefrom are not anticipated by these references.

Moreover, dependent claims 6 and 12 further recite calculating the heat generation rate "based upon a difference in the control parameter between two predetermined points." This feature is also not taught in Shibata or Nakamura.

Withdrawal of the rejections is respectfully requested.

Claims 13-14 are added and recite that the combustion rate is calculated based on only three crank angle positions. These claims are supported, for example, by Applicants' specification at pg. 22, lines 8-14. This provides an accurate rate computation while greatly reducing computational load over a method with minute readings of every crank angle.

Neither Shibata nor Nakamura teach or suggest such a feature. Accordingly, claims 13-14 are allowable for their dependence on allowable base claims and for the additional features recited therein.

Claims 15-16 are added and recite that the index is a ratio of specific heat. This feature is supported, for example, at page 21, lines 10-14.

Neither Shibata nor Nakamura teach or suggest such a feature. Accordingly, claims 15-16 are allowable for their dependence on allowable base claims and for the additional features recited therein.
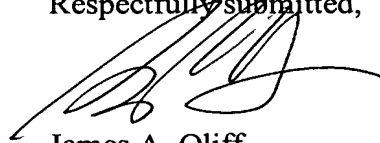
Claims 17 and 18 are added. Claim 17 is supported, for example, by S40 in Fig. 6 and claim 18 is supported, for example, by S24 in Fig. 5.

Neither Shibata nor Nakamura teach or suggest these features. Accordingly, claims 17-18 are allowable for their dependence on allowable base claims and for the additional features recited therein.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the pending claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

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